2.5 Project design

Performance spec

Project design involves converting the concept established at the planning stage into a working performance spec. The scope of supply and scope of functionality are defined, the spatial arrangement, device types and logical links. The mains part of the *EIB* installation is planned in the usual way and is not dealt with in this manual.
When designing an *EIB* installation particular attention should be paid to the bus-specific thresholds concerning the line lengths (see Table 2.5-1) and the guidelines for the topology (see chapter 2.1.2). When selecting the installation locations for the bus devices follow the advice of the manufacturer, e.g. observe the permitted ambient temperature, stipulated protection level etc.

Total length of all wires laid in a line	≤ 1000 m
Line length between two bus devices	≤ 700 m
Line length between two *EIB* supplies including choke and each bus device	≤ 350 m
Line length between two *EIB* supplies (two *EIB* supplies including choke within a line)	≥ 200 m

Table 2.5-1 Threshold values of the wire lengths per line

2.5.1 Bus devices and installation material

2.5.1.1 Bus devices

The bus devices consist of the bus coupling unit (BCU) and the application module / terminal (see Fig. 2.1-8). The information to be processed is transferred from the bus to the bus coupling unit (see Fig. 2.1-9). The latter transmits and receives data, guarantees the power supply for the electron-

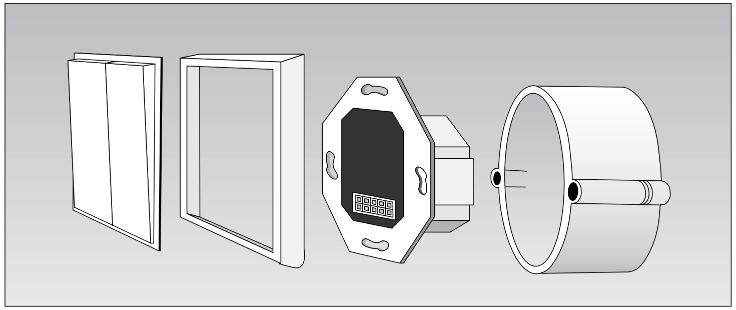

Fig. 2.5-1 Bus devices for flush mounting

ics and stores important data such as the actual physical address, one or more group addresses as well as the application program with parameters. These functions are coordinated out by a microprocessor, the "brain" of the bus coupling unit.

Application program

The application module and application program establish the function of the bus device. This may be a pushbutton, a display or a data interface.
Depending on the design of the bus device, the bus coupling units and application modules are plug-in types (e.g. flush-mounted units and DIN rail mounted units) or they are integrated as permanently connected units within a housing (e.g. built-in and surface-mounted units) (see chapter 2.1.6).
The bus coupling unit, application module and application program of a bus device must all be manufactured by the same manufacturer. Bus devices are offered in various designs.

Flush mounting
Rail mounting
Surface mounting
Built-in devices

- Bus devices for flush mounting (see Fig. 2.5-1)
- Bus devices for rail mounting (see Fig. 2.5-2)
- Bus devices for surface and built-in mounting (see Fig. 2.5-3)

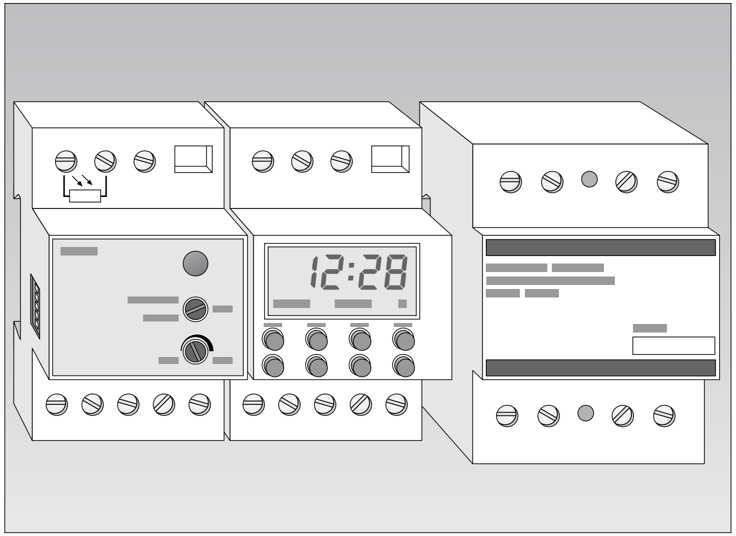

Fig. 2.5-2 Bus devices for rail mounting

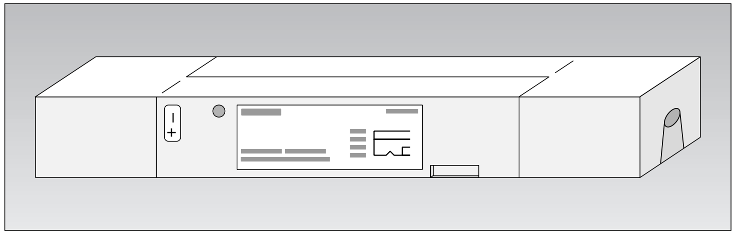

Fig. 2.5-3 Bus device as a built-in unit

2.5.1.2 Installation material for the bus installation

2.5.1.2.1 General requirements

EIBA trademark

Electrical safety on the side of the bus is guaranteed by the use of standardised installation material or that, which has been certified by EIBA; this also guarantees trouble-free communication. EIBA certified installation material is labelled with the EIB® trademark (see chapter 2.1.8).

Type	Design	Installation
YCYM 2×2×0,8	EIBA guidelines (Basis: DIN VDE 0207 and 0851) Wires: red (+EIB) black (–EIB) yellow (free, optimal +EIB) white (free, optimal –EIB) Shielding film with tracer Wires and screen with common casing	Permanent installation: Dry, humid and wet rooms: On, in and flush to the surface and in pipes Outside: If protected from direct sunlight Bending radius: > 30 mm for fixed installation > 7 mm for inputs into sockets and hollow spaces
J-Y(St)Y 2×2×0,8 *EIB* design* *) see appendix	DIN VDE 0815 Wires: red (+EIB) black (–EIB) yellow (free, optimal +EIB) white (free, optimal –EIB) Shielding film with tracer Wires and screen with common casing	Permanent installation: Dry and humid factory offices: surface and flush mounting and in pipes Outside: Built-in and flush mounting Bending radius: > 30 mm for fixed installation > 7 mm for inputs into sockets and hollow spaces

Table 2.5-2 Examples of permitted bus lines

2.5.1.2.2 Bus lines

Bus lines for the *EIB* satisfy two essential requirements:

– Trouble-free communication according to the *EIB* standard (DIN EN 50090-2-1 and DIN EN 50090-2-2).
This requires shielded bus lines with twisted pairs and a line diameter of 0.8 mm (see the *EIB* bus line specification in Appendix G).
– Protective separation from the mains network (see chapter 2.6.1).
Examples of permitted bus lines are listed in Table 2.5-2.

The mains cables used in the electrical installation must not be used as bus lines (security, function, and danger of interchanging!).
If halogen-free lines are required, the J-H(St)H2x2x0.8 can be used.

Halogen-free line

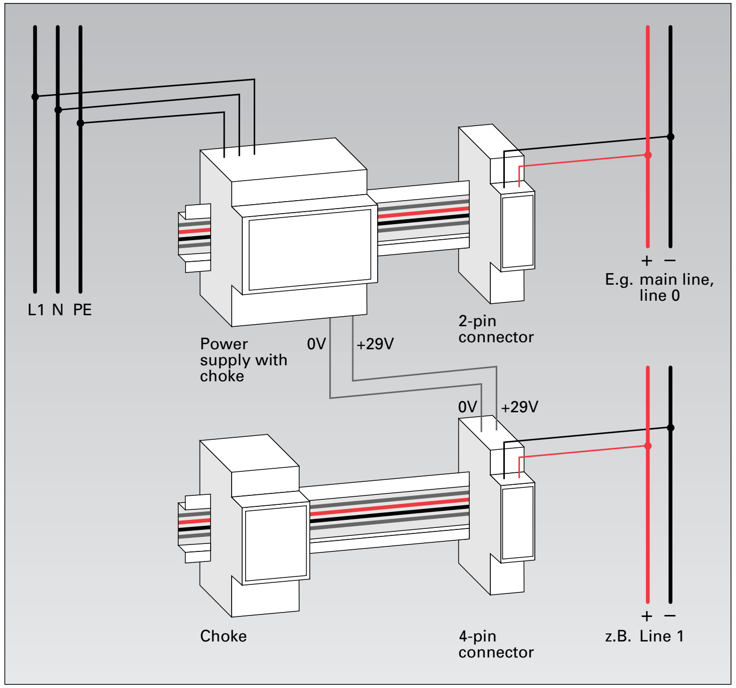

Fig. 2.5-4 Connection of an EIB power supply with the bus lines

Underground telecommunications cable

To connect two buildings with the *EIB*, the underground telecommunications cable, A-2Y(L)2Y or A-2YF(L)2Y, can be used, or alternatively the *EIB* bus line can be used providing there is a closed, dry pipe system (see chapter 2.5.3).

Free wire pair

Guidelines for the use of the free wire pair for additional applications:

– extra-low voltage only (SELV/PELV)
– max. 2.5 A constant current; excess current protection (overload and short circuit) is necessary
– voice transmission permitted, but not as remote signalling lines of the public telecommunications network.

The second pair of wires must be used in the same way within a line. It is recommended that the same type of usage is employed for the second wire pair within the entire building.
Moreover, we also recommend that pairs of wires used for additional applications are clearly marked at all conductor ends.
If the second twisted pair is used as a further line, the yellow wire should be used for +*EIB* and the white wire for –*EIB*.

2.5.1.2.3 *EIB* power supply and choke

EIB power supply with integrated choke

The *EIB* is supplied with SELV low voltage via an *EIB* power supply with integrated choke. This device is currently available as a unit for mounting onto the DIN rail.
We recommend using a separate circuit for the mains connection of the *EIB* power supply (security of supply, see chapter 2.1.9) and installing the power supply at the centre of the line's load. On the bus side the *EIB* power supply is current limited and short circuit proof.

Line load centre point

Only power supplies that have been certified by EIBA may be used. Fig. 2.5-4 illustrates the connection of an *EIB* power supply with the bus lines.
Bus connection terminals and data rail connectors for the bus connection are easily fitted, offer high contact reliability and cannot be confused with terminals and connectors for other circuits.

Bus connection terminals

Bus connection terminals

The bus connection terminal connects bus devices with the bus line and facilitates branching, which means that the bus is not interrupted and remains functional whenever exchanging devices (see Fig. 2.5-5).
The bus connection terminal (terminal block) consists of two halves (red and dark grey) that are permanently fixed together and only fit the pins of the bus device (red to "+" and dark grey to "-"). Observe correct polarity.

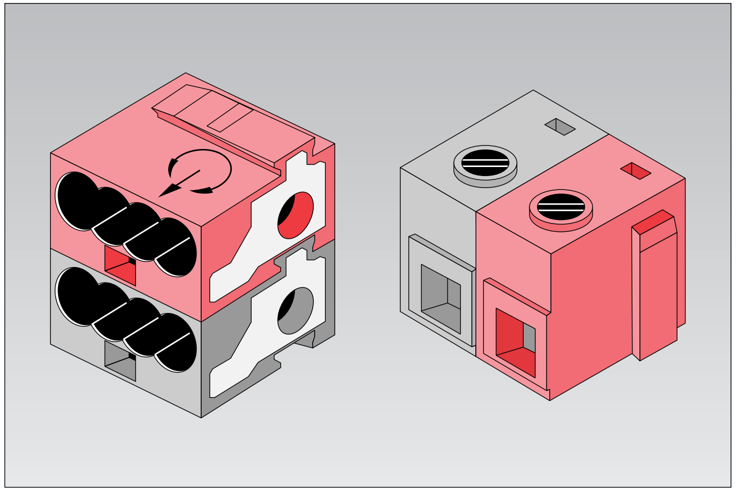

Fig. 2.5-5 Bus connection terminals

Data rail
DIN rail

Data rails and covering
The data rail (see Fig. 2.5-6) fits into the 35x7.5 DIN rail in accordance with EN 50022. It is self-adhesive and with that is easily fixed into the rail. The data rails are available in various lengths.
Free sections of the data rails must be protected by suitable coverings that can be clipped onto the DIN rail.
The bus voltage is supplied to both internal conductors of the data rail via the choke.
The two external conductors connect the *EIB* power supply with an external choke for a second line.

Data rail connector
Spring connection block

Data rail connector
The data rail connector allows bus lines to be connected to the data rail and data rails to be connected with one another. Data rail connectors are connected to the bus via spring connection blocks. The bus line is connected via plug-in terminals or bus connection terminals (see Fig. 2.5-7).

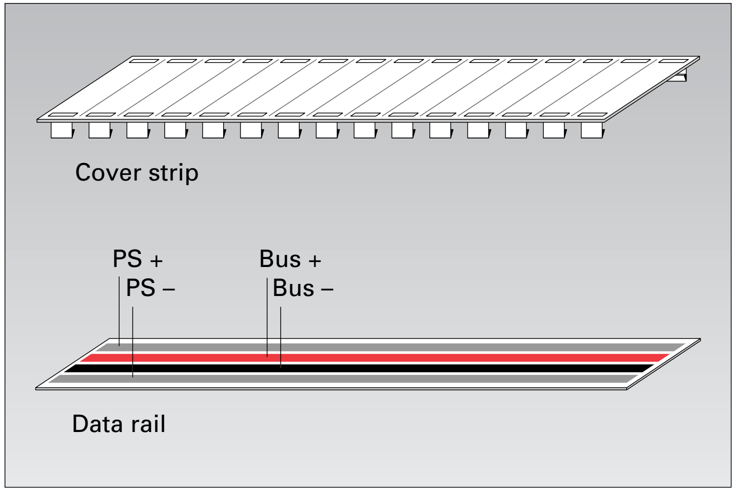

Fig. 2.5-6 Data rail and data rail covering

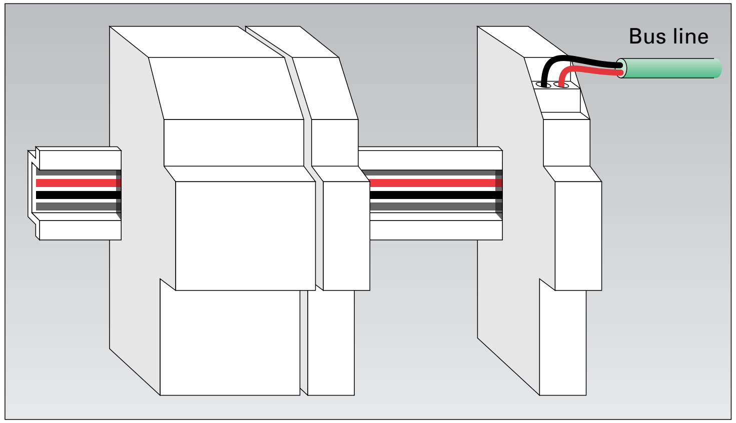

Fig. 2.5-7 Data rail connector

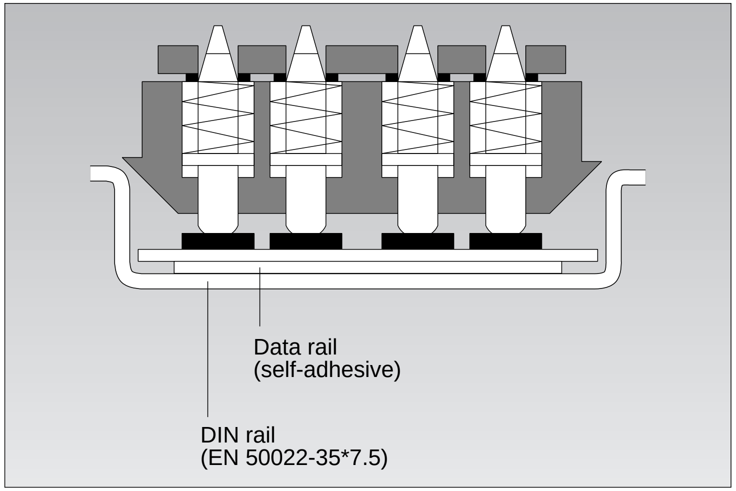

Fig. 2.5-8 *Example of implementing a push contact system for DIN rail mounted units*

Spring connection block

In the case of DIN rail mounted units with a push contact system, this forms the connection to the data rail (see Fig. 2.5-8).

2.5.1.2.5 Installation sockets and distributors

Installation socket

Regular distribution panels and installation sockets can be used for the bus installation. The installation sockets for flush-mounted devices must be suitable for screwed fixing.

2.5.2 Planning the bus devices

2.5.2.1 General advice

With *EIB* installations, the individual bus devices and how they work together determine the functionality.
In order to design an *EIB* installation therefore, the electrical and mechanical properties of the bus devices as well as their application programs and adjustable parameters must be known.
When designing the project we recommend that you first consider the functionality required in each individual room before looking at the more general functions.

2.5.2.2 Selecting and placing the bus devices

Auxiliary supply

It is now necessary to establish the service points within the rooms, if this has not already been achieved in the initial planning stage. When designing the project it must be remembered that some bus devices require an auxiliary supply, usually 230 V AC.
It is also necessary to consider the environmental conditions, i.e. the external influences such as temperature, dust and water.
And furthermore, devices such as "white goods" etc. require the use of a appliance interface (see chapter 2.3.2).
After this and depending on the required function, the devices and application programs are selected, e.g. a two-way pushbutton with the "dimming" application program (application). These devices are usually flush-mounted.
After this you should select the appropriate devices according to the assigned actuator functions. These are available as flush-mounted and surface-mounted devices or as DIN rail mounted units. They also exist as equipment with integrated bus devices, all other functions such as for example, binary inputs for the window monitoring and timers etc. shall now be considered and the corresponding devices

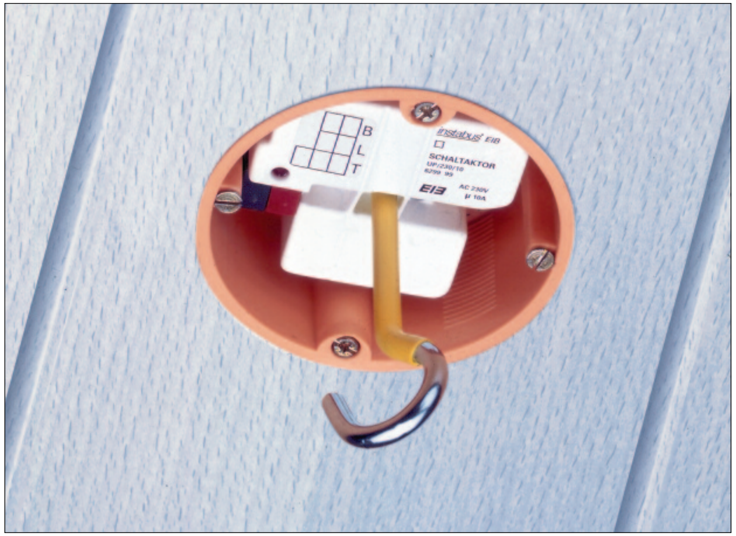

Fig. 2.5-9 *Flush-mounted switching actuator in a ceiling socket*

selected.

Light intensity switch
Central OFF/UP
Timer

When you have planned the bus devices for each individual room you can then go on to consider the universal functions affecting all rooms, such as for example, light intensity switches, central OFF/UP function, timers etc. and in the same way select the required devices.

2.5.2.2.1 Flush-mounted devices

Installation sockets with screws which comply with DIN VDE 0606-1 or DIN 49 073-1 are required for fixing flush-mounted devices.

Device connection socket

If more than two bus lines are to be used within an installation socket, we recommend allowing for device connection sockets 60 mm in depth. The combination of a bus device in flush-mounted format with a plug socket under the same covering is only permitted if the socket is protected against direct contact or the DIN VDE guidelines have been followed.
Flush-mounted switching actuators can be supplied for

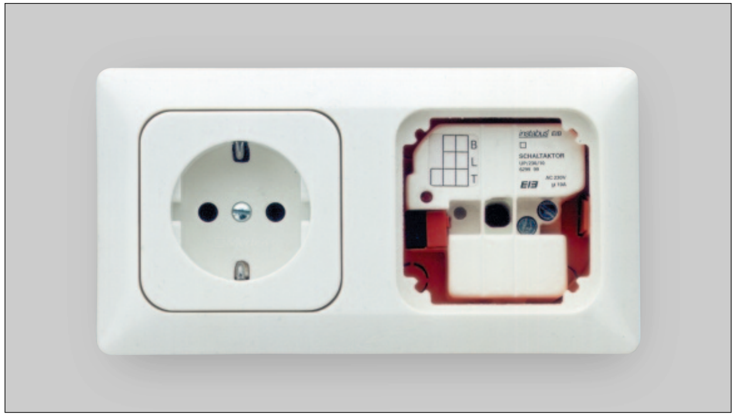

Fig. 2.5-10 *Flush-mounted switching actuator combined with a plug socket*

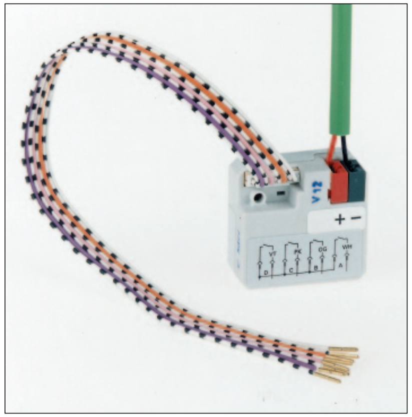

Fig. 2.5-11 *Flush-mounted pushbutton interface*

Flush-mounted switching actuator

the switching of ceiling lights and hanging lights (see Fig. 2.5-9).
It is also possible to combine plug sockets with flush-mounted switching actuators. This means that it is possible for example, to switch standing lights on and off via *EIB* (see Fig. 2.5-10).
If desired, the flush-mounted switching actuator can be fixed behind a blank covering.
A flush-mounted pushbutton interface (see Fig. 2.5-11) that fits into the 60 mm deep connection socket is available to provide the link between conventional switches and pushbuttons and the potential contact.

2.5.2.2.2 Equipment with built-in bus devices

Using equipment with built-in bus devices (e.g. lights with built-in switching actuators) simplifies wiring arrangements and installation.

2.5.2.2.3 Using a HomeAssistant

If the use of a HomeAssistant is planned (see chapter 5), then it is necessary when designing the *EIB* installation to make allowances for additional special connections in addition to the usual requirements of a bus system.
Chapter 5.3 outlines the general requirements for a PC that is to be used for the operation of a HomeAssistant, as well as those for the monitor.

2.5.2.2.4 DIN rail mounted devices

Distribution boards should be planned to secure bus devices with spring connection blocks, used with 35x7.5 DIN rails compliant with EN 50 022. If using DIN rails with a greater depth, it is necessary to ensure secure contact with the inserted data rail.

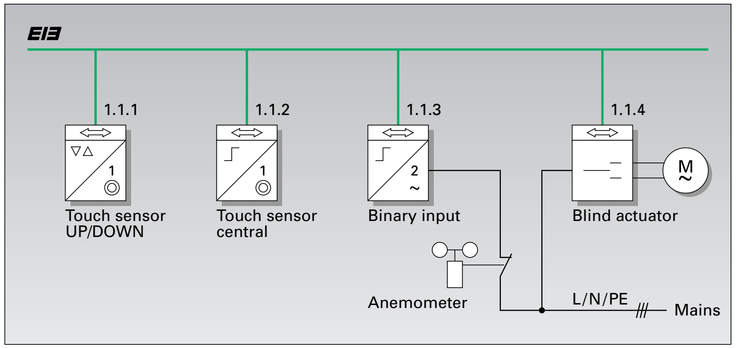

Fig. 2.5-12 Logic diagram

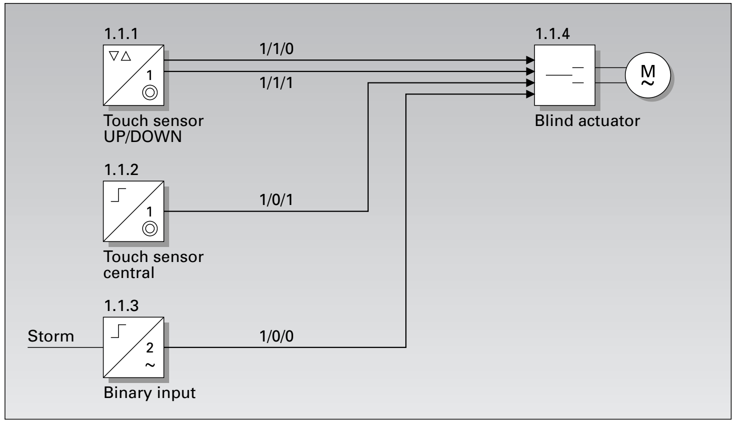

Fig. 2.5-13 Functional diagram

2.5.2.2.5 Functional representations

Logic diagrams, functional diagrams and parameter blocks are used to represent the logical connections in a clear and comprehensible way. These diagrams are extremely useful when dealing with more complex tasks.
They are also helpful when extending or modifying systems as well as during diagnosis and troubleshooting.

Logic diagram
The logic diagram illustrates the symbols of the used bus devices and the physical connection (wire) to the lines. This representation can also be incorporated into the ground plan.

Functional diagram
The functional diagram illustrates the functional links between the devices and how they influence each other.

Parameter blocks
The parameter blocks are a representation of device + application + object + parameter.

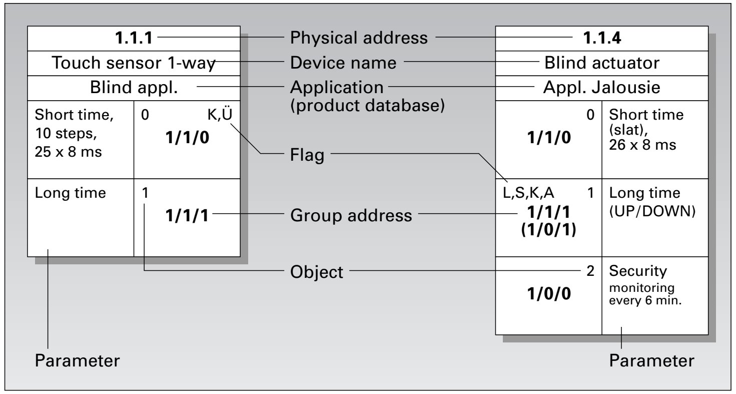

Fig. 2.5-14 Parameter blocks

In the above diagram only the parameter blocks for devices 1.1.1 and 1.1.4 are represented.
The representations and functional connections are independent of the transmission media.

2.5.2.2.6 Design of the distribution panels

SELV PELV

Bus devices and mains equipment can be installed together in distribution panels. It is necessary to ensure however that all circuits, that are not SELV or PELV low voltage, are securely isolated from the EIB (see chapter 2.6.1.1.2). It may be necessary in some cases to install additional covering or separating walls.
It must also be remembered that any sections of data rail not covered by devices need to be provided with suitable covering. This protects the data rail from dirt and also ensures secure separation.
When using *EIB*, extensions to the system are far easier than with conventional technology, and can therefore be made more frequently. The size of the distribution panel should be selected so that it provides sufficient space for the bus devices and any extensions. The required space

also depends on the topology and form of the implemented bus devices.
Devices with a high degree of stray power should be placed in the upper area of the distribution panel. To improve the clarity, we suggest arranging bus devices and conventional mains devices in separate sections.

2.5.2.3 Dividing the bus devices between lines and areas

After selecting and placing the bus devices, the next step is to define the lines and areas and distribute the devices among these. This is achieved by making entries in the corresponding equipment lists and assigning the physical addresses. When doing this it is necessary to ensure that limits on line lengths and number of devices are not exceeded (see Table 2.5-1).
In designing the project we recommend that a reserve of 20% per line and area is allowed when assigning bus devices, so that the line can easily be extended at a later date.

2.5.2.4 Wiring arrangement

Installation zone

The wiring arrangement of *EIB* is laid out together with the mains power lines in the installation zones established according to DIN 18015-3 (see Fig. 2.5-15 and 2.5-16).
Depending on the structural opportunities, both ceiling-based (see Fig. 2.5-17) and floor-based wiring arrangements (see Fig. 2.5-18) are possible.
The bus lines to the individual rooms are either led separately to the distribution panel, i.e. in a star formation (see Fig. 2.5-19), or they are branched from room to room (see Fig. 2.5-20). The separation into different areas and lines must be taken into consideration.
The distribution panels of a building (main and secondary) should always be connected with a bus line.
Entire floors or larger areas should basically be connected with the (main) distribution panel in a star formation.

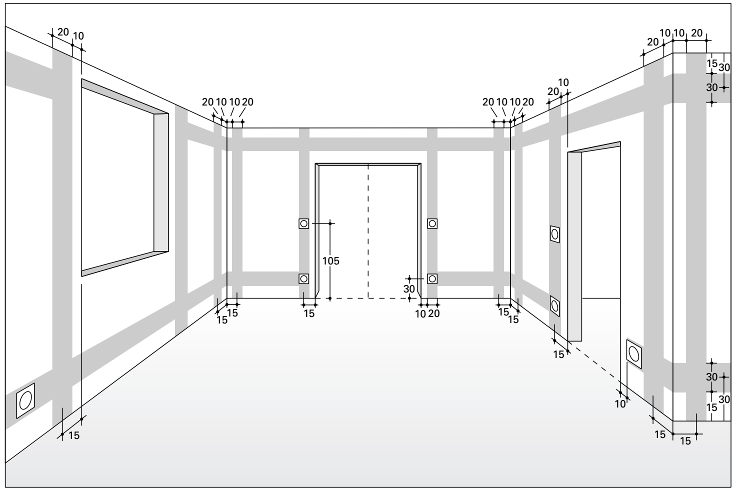

Fig. 2.5-15 *Installation zones for rooms without working surfaces on the walls (taken from DIN 18015-3)*

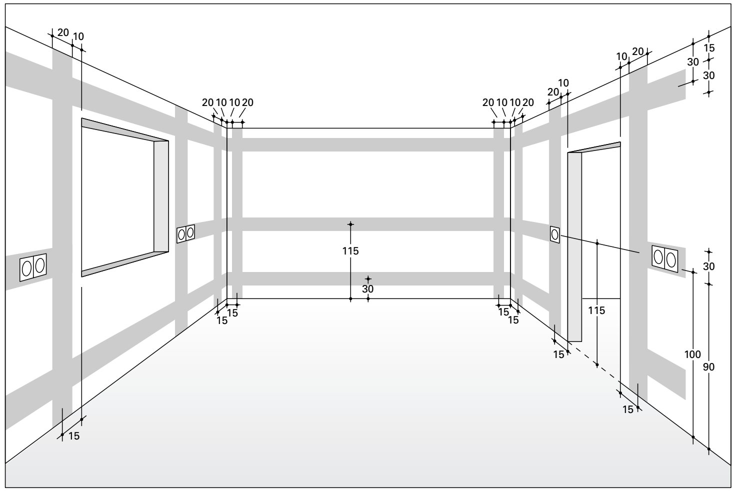

Fig. 2.5-16 *Installation zones for rooms with working surfaces on the walls (taken from DIN 18015-3)*

Transmission via bus lines

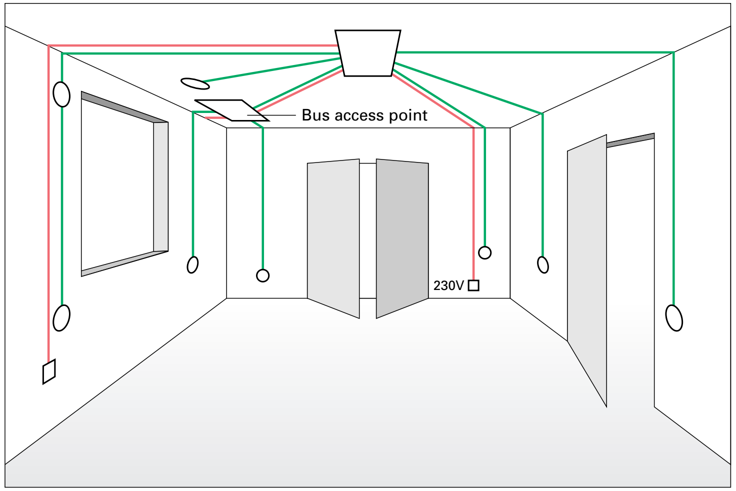

Fig. 2.5-17 *Ceiling-based wiring arrangement*

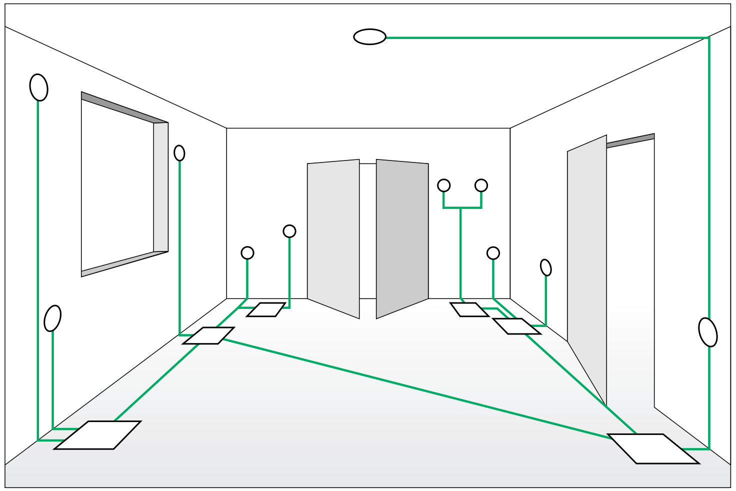

Fig. 2.5-18 *Floor-based wiring arrangement*

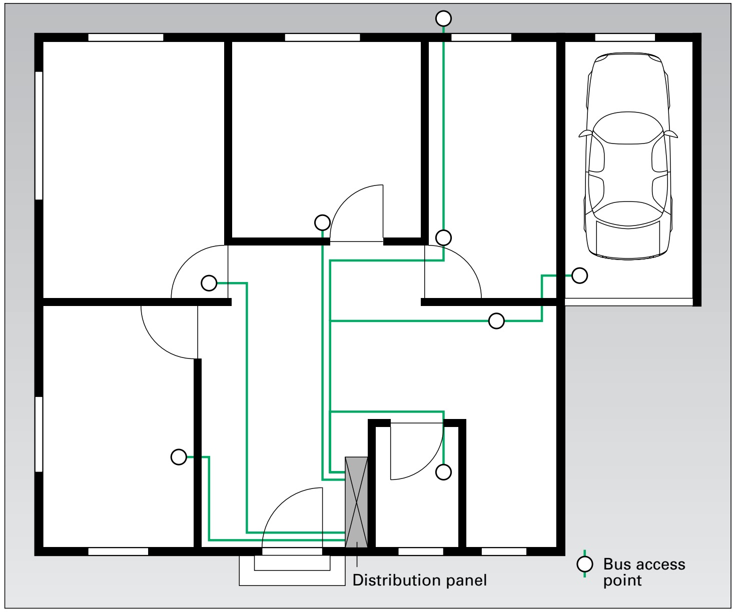

Fig. 2.5-19 Star-shaped wiring arrangement

All networks within the building e.g. 230/400 V mains, *EIB*, TV and telephone, should be accessible in one location in the building (main distribution panel/connection room) and possibly also linked together via gateways.

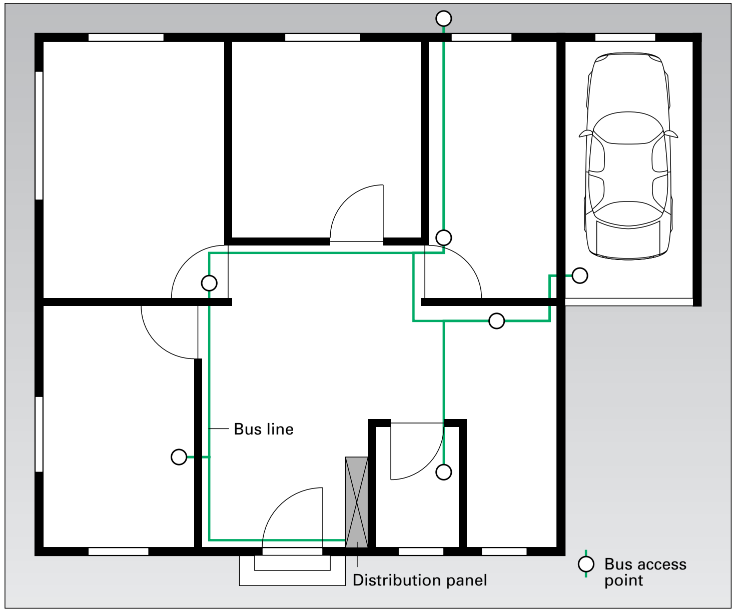

Fig. 2.5-20 Looped wiring arrangement

2.5.3 Protection against lightning and overvoltage

2.5.3.1 The necessity of lightning protection

Lightning protection

The individual regional councils have deemed it necessary to set up lightning protection systems in buildings. In general, the buildings that require lightning protection are "those which depending on position, type or usage are susceptible to lightning or where it may have serious consequences". For public buildings such as schools, lightning protection is a pre-requisite.

Potential equalisation

Lightning arrester

In the standards that are currently valid as regards setting up lightning protection systems (DIN VDE 0185, IEC 1024-1), lightning protection potential equalisation is also a compulsory requirement for active conductors. The link is made indirectly via lightning arresters (see Fig. 2.5-21).

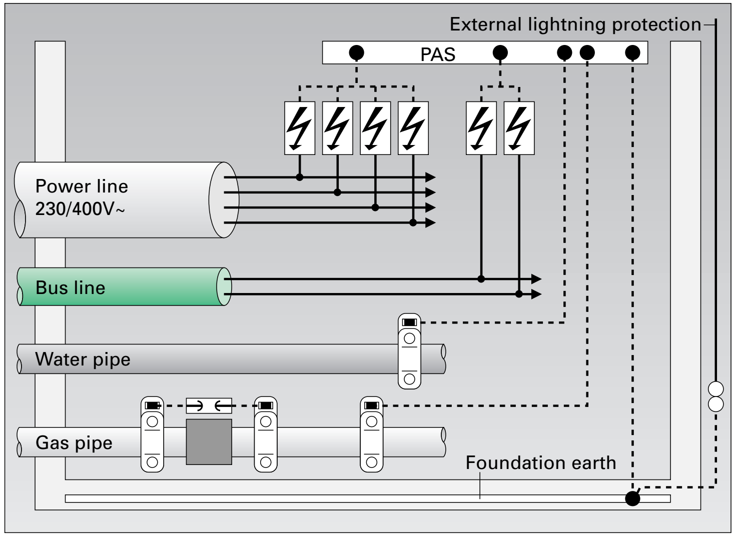

Fig. 2.5-21 Lightning protection potential equalisation (primary protection)

2.5.3.2 Design guidelines for protection against lightning and overvoltage

Primary protection

If lightning protection is required, then in accordance with DIN VDE 0185-1 or following DIN V EN 61024-1/VDE 0185-100 connection of the active wires must be achieved with lightning arresters (primary protection).
This is also recommended if, for example
- the building is connected via a low voltage overhead line,
- parts of the building into which lightning can strike are made of metal, e.g. metal flues or antennae,
- there is another building near to the building in question that has a lightning protection system.

When cables are laid to incorporate more than one building, lightning arresters must be installed for the bus line where it enters the building (see Fig. 2.5-22). Alternatively, the bus line that is protected with surge arresters (see Fig. 2.5-23)

must be laid in a metal channel or pipe that is incorporated into the potential equalisation on both sides.
The minimum cross section of the channel or pipe is that which allows a significant percentage of the lightning current to be conducted through it (in accordance with DIN VDE 0185-100: Cu 16 mm2, Al 25 mm2, Fe 50 mm2).

2.5.3.2.1 Lightning arresters (for the primary protection)

Lightning arresters are capable of diverting high-energy component lightning currents in a totally non-destructive way. They must meet the following specifications:

- For the 230/400 V AC network
- Nominal discharge capacity at least 10 kA (10/350).
- Protection level: < 4 kV,
- Lightning arrester class B corresponding to DIN VDE 0675-6/draft 11.89

- For the bus line
- Nominal discharge capacity at least 1 kA (10/350).
- Protection level: < 4 kV,
- Lightning arresters are specified in IEC SC 37A and DIN VDE 0845-2 (draft)

When designing the project, the lightning arresters must be selected to co-ordinate with the overvoltage protection. The manufacturer specifications regarding the use of their lightning arresters must be observed.

2.5.3.2.2 Overvoltage protection for the 230/400 V AC network (secondary protection)

Surge arresters for the 230/400 V AC network are built into distribution panels. Class C surge arresters in accordance with DIN VDE 0675-6 (currently in draft form) should be used which satisfy the following requirements:

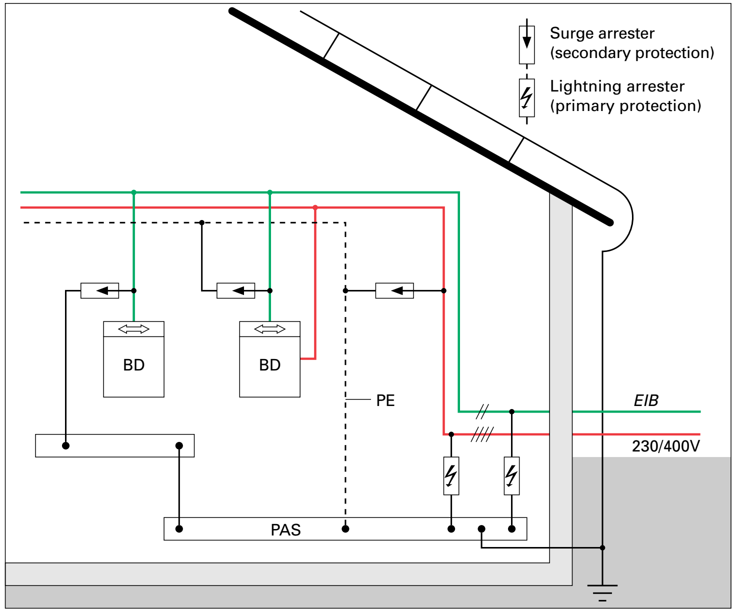

Fig. 2.5-22 *Connection of surge arresters (secondary protection) and lightning arresters (primary protection)*

– Nominal discharge capacity at least 5 kA (8/20),
– Protection level < 2 kV,
– If varistors are used, they must be heat-monitored and provided with a separation device.

Surge arresters that correspond to the above mentioned requirements can be used as charge eliminators for the overvoltage protection. They are also supplied in a format that can be snapped onto the DIN rail. When they are used on DIN rails with built in data rails, it is necessary to ensure that:

– The arresters are completely insulated (base insulation 250 V; for example no open dischargers).
– The DIN rail must not be used to earth the charge eliminators (no metal parts for the snap fastening); the charge

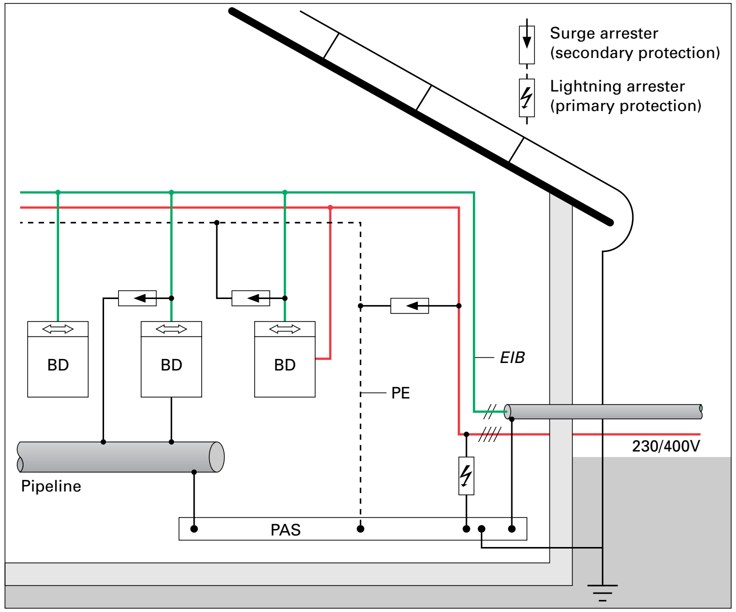

Fig. 2.5-23 *Connection of surge arresters with cables laid in metal channels or pipes between buildings*

eliminators (arresters) must have an earthing terminal, which with the corresponding cross section is connected to the local equipotential busbar.

2.5.3.2.3 Overvoltage protection (secondary protection) for the *EIB*

Surge arresters must satisfy the following requirements:

– Nominal discharge capacity at least 5 kA (8/20)
– Protection level: < 2 kV

Level ratios

The surge arresters are specifically matched to the level ratios in an *EIB* installation.

Surge arrester

Surge arresters have the same dimensions as bus connection terminals (see chapter 2.5.1.2.4). They are distinguished

by colour (the entire terminal is blue) and by the additional earth wire (see Fig. 2.5-24). The surge arrester can be installed in place of the bus connection terminal, whereby it is connected to the next earthing point (for example an earthed conductor).
With this surge arrester, no looping of the bus is possible.
Independent of measures for overvoltage protection within the framework of lightning protection, it may be necessary to increase the immunity of the EIB installation by using surge arresters.

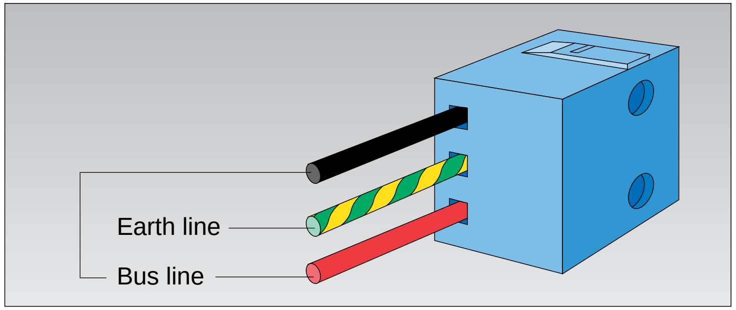

Fig. 2.5-24 Surge arrester

2.5.3.3 Recommendations for installing surge arresters

Surge arresters are recommended for use with bus devices of protection class 1 as well as devices to which a second network is connected (230/400 V AC and/or the heating system pipe network) in addition to the bus line. With that, the earthing point is also given.
It is sufficient in distribution panels to wire every bus line with one surge arrester.

Active and neutral conductors

If the bus lines are wired with surge arresters in the distribution panels, the active conductors and the neutral conductors must also be wired with surge arresters (see chapter 2.5.3.2.2).

With lights that have built-in switching actuators, surge arresters need only be installed if the bus line and mains power line cover a large area.

2.5.3.4 Avoiding overvoltage as a consequence of loop forming

Loops

Loops are often the cause of EMC disturbances through surge voltages as a result of lightning. Such loops therefore should be avoided wherever possible. This should be given particular consideration in the design phase.

Surge voltage

Loop forming

Loops arise when two independent networks are connected to one device. Induced surge voltages lead to breakdowns in the connected devices, which in turn causes damage. The effect of the loop depends on the overall area. Loop forming must be looked at across the entire installation and all extended conductive parts must be considered (see Fig. 2.5-25).
When designing an *EIB* installation therefore, it is necessary to ensure that the requirements for the proper installation of surge arresters are fully satisfied. This means that it is necessary to provide a connection point for the surge arrester.

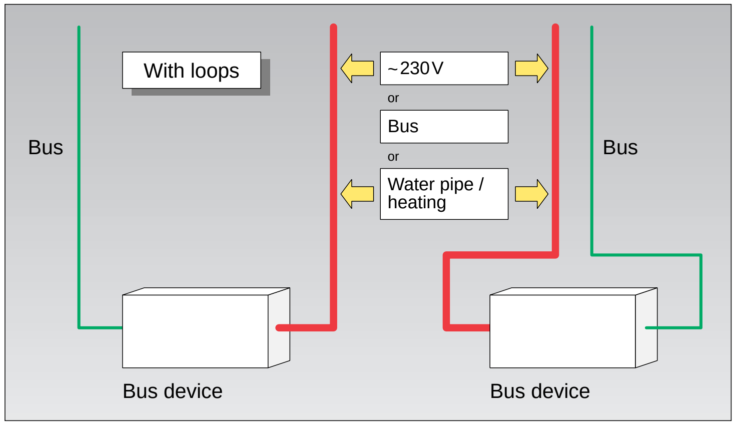

Fig. 2.5-25 Loop formation

The following rules must be observed:

- Bus and mains power lines must always be laid as close together as possible. This is also valid for earthed parts, if the bus devices have operational contact with them (e.g. heating valves).
- Line ends should be as far away as possible from earthed parts and other line ends.
- Keep sufficient distance from the lightning protection system (e.g. from the surge arresters).
- Rolled up cable ends are not loops in the above-mentioned sense.

2.5.3.5 EMC protection management for structural systems

EMC protection management

Supplementary to protection against lightning and overvoltage, it is possible to work out an EMC protection management plan for structural systems, such as for example, computer centres.
If an *EIB* system is installed in such a building, it must be incorporated into the EMC protection management.
The measures associated with this must be discussed in detail with the person responsible for the EMC protection management.

2.5.4 Functional security

If there are any special requirements for reducing risks to employees or objects (functional security), then additional measures must be initiated and these measures must be incorporated into the planning.
The individual devices for the *EIB* are constructed in the same way as conventional devices in that alone they pose no risk. However, the interaction of many devices within a system, or the breakdown of devices or functions can cause certain risks.

These risks can be reduced in a number of ways depending on the system, the application and the wishes of the customer. The action itself however must be independent of the operation of the system and it must always be available. As a guideline, the most important applications, their risks and global measures to reduce these risks are summarised in Tables 2.5-3 and 2.5-4. The measures correspond to the procedures generally employed today and are not specific to the bus, although they can be partially implemented with the *EIB*. Risks of class III and IV do not usually necessitate action.

Application with installation bus		Risk	Risk class		Risk reduction		
			Persons	Objects	Action	Attained risk class	
						Persons	Objects
Heating		Overheating	II	I	Safety thermostat	III	III
		Breakdown	II	II	A+D or C+D	III	III
Air con	Home/building	Breakdown	III	IV	—	–	–
	Storage rooms	Breakdown	–	I	A+D or B+C	–	III/II
Ventilation	Home	Breakdown	IV	IV	—	–	–
	Conf. rooms	Breakdown	IV	IV	—	–	–
	Stockbreeding	Breakdown	–	I	A+D, C+B or A+B+D	–	II/II/III
Fire alarm system		Malfunction	I	I	E.g. damage limitation guidelines	III	III
Smoke detectors		Malfunction	II	II	C	III	III
Security check (For grade 1 & 2, according to CIC/CT 106 SECT 102)		Malfunction	III	II	B+C + UPS	Application specific	III
Load management (No essential functions)		Malfunction	III	III	—	–	–
Energy management (Co-ordination of various energy sources)		Malfunction			Under preparation		
Blind control		Malfunction	III	I	A or C	III/III	III/II
Gate control		Normal function	I	II	Safety switch; safety precautions as part of the gate + D	III	III
		Malfunction	–	II	A	–	III
Check, status message and output of data:							
a) Safety relevant data		Malfunction	I	–	Under preparation		
			–	I	Redundant system	–	III
b) Informative data		Malfunction	IV	–	—	–	–
c) Technical alarm (t safety related)		Malfunction	–	II	A or C	–	III

Table 2.5-3 Functional security, part A

Application with installation bus	Risk	Risk class		Risk reduction		
		Persons	Objects	Action	Attained risk class	
					Persons	Objects
Lighting control:						
- Rooms	Malfunction	IV	IV	—		
- Public access areas	Switched off	II	IV	Lights connected to two independent bus and mains power lines in alternation and pre-set ON command	IV	IV
- Security lighting	Malfunction	I	I	Measures independent of the bus in accordance with the valid regulations		
Medical equipment	Malfunction	I	–	Measures independent of the bus in accordance with the valid regulations		
Emergency off	Malfunction	I	I	Measures independent of the bus in accordance with the valid regulations		
Connected socket	Malfunction	II	II	Identification, warning advice, warning indication		
Lifts for material transport	Malfunction	II	II	Safety switch; safety precautions as part of the lift		
Equipment for disabled persons (non-medical)	Malfunction	II	II	Measure depends on the application		
P.A. systems and internal phone systems						
- Hospitals etc.	Breakdown	II	–	A or C	III	–
- For information	Breakdown	IV	–	—	–	–
Risk classes Acc. to IEC 65A (SEC) 123:	I = Not tolerable III = Tolerable			II = Unwelcome IV = Can be ignored		
Measures:	A = Status message + alarm C = Data output + alarm			B = Separate bus line D = Manual control independent of the bus		

Table 2.5-3 Functional security, part B

2.5.5 Address allocation and design lists

EIB tool software

Planning and commissioning software, the *EIB* Tool Software (ETS) is required for the project design stage and subsequent commissioning of an *EIB* installation.
A detailed description of ETS 2 is given in chapter 6. Recommendations on practical procedures are given in the training documentation.

2.5.5.1 Address allocation

The physical address is the unique identification for a bus device and specifies the area and line in which it is installed. The physical address is subdivided into area, line and device which, when written down, are formally separated by dots. For example, device 3 in area 1 and line 2 is denoted by the physical address 1.2.3.
If the bus devices are only to be programmed after installation, it may be useful to specify the physical addresses within a line at the project design stage. This minimises the necessary work when programming. The physical addresses should therefore be allocated in sequence for neighbouring bus devices.
With *EIB*, the group addresses establish which bus devices work together, e.g. which sensor controls which actuator.

Main group
Middle group
Sub group

Group addresses consist of main, middle and sub groups that are separated by back slashes, e.g. 1/2/16. It is possible to specify up to 16 main groups, 16 middle groups and 256 sub groups.
The structure of the group address can be seen as an organisational feature. In principle, the group addresses can be ordered according to various criteria. In practice it has proven useful to assign main groups according to the application area, and the middle and sub groups according to location/room.

Example:

Main group	Middle group	Sub group	Group address
1 Lighting	2 Central building	1 Stairwell	1/2/1
		2 Underground car park	1/2/2
2 Blinds	3 Office building	1 Room 746	2/3/1

With the group address 1/2/1 one or several sensors can activate one or several actuators with the common function of controlling the lights in the stairwell.

2.5.5.2 Equipment list

Equipment list

The equipment list can be partially drawn up during the initial talks with the customer. It firstly provides a piece list of the necessary components and is also used as the basis for programming the bus devices (see chapters 2.5.5.4 and Fig. 2.5-26 shows the layout of an equipment list that has been tried and tested. The first four columns contain:

– the physical address assigned to the device,
– the bus device type code (e.g. 4-way switching actuator, DIN rail mounted device),
– the manufacturer,
– the installation site.

The remaining columns represent:

– the number of the input/output channel,
– the transmitted and received group addresses assigned to the channel,

EIB	Equipment list	Project:		Written:	Last changed:	Page:	
				Author:	Changed by:	Of:	
Physical address	Device type	Manu-facturer	Installation site	Chan.	Sent address	Received address	Remarks

Fig. 2.5-26 Equipment list

– notes on the planned function in the building (e.g. lighting strip 1 switched locally).

2.5.5.3 Function list

Function list

The function list (see Fig. 2.5-27) is based on the group address. It represents the functional interaction of the *EIB* installation; e.g. which sensors control which actuators. The relevant group address is entered in the first column. The next four columns contain

– the physical addresses,
– the available channels of the sensors and actuators.

This provides a line by line representation of the connection between group address and assigned bus devices. It is wise to record the function of the group address in the 'Remarks' column, e.g. lighting in the stairwell or blind in room 746.

EIB	Function list	Project:	Written:	Last changed:	Page:
			Author:	Changed by:	Of:
Group address	Sensor		Actuator		Remarks
	Physical address	Channel	Physical address	Channel	

Fig. 2.5-27 Function list

2.5.5.4 Software for designing a project

Product database
User manual

The ETS is required when designing the project (see chapter 6). The ETS is used to create the data sets that need to be loaded into every bus device. Every data set consists of the application program, the functional parameters, the physical address as well as the assigned group addresses. At the moment it is only possible to load an application program into a bus device if both are from the same manufacturer. The application programs are included in the manufacturer-specific product database. The manufacturers of the bus devices provide the product data on disk. More detailed information is given in the user manuals accompanying the software. The ETS is also used to document an *EIB* installation

2.5.6 Documentation

The results of the project design stage should be documented. This documentation is required for all further steps (installation, commissioning, and maintenance) and consists of:

– Documents or training documentation in accordance with the standards of the EN 61082 or DIN 40719 series, especially for the given bus devices and bus lines.
– The function and equipment lists created with the planning and commissioning software.
– The project data created with the planning and commissioning software and stored on disk.

If any modifications arise during the commissioning of the *EIB* installation, then the documentation created at the design stage should be corrected accordingly.